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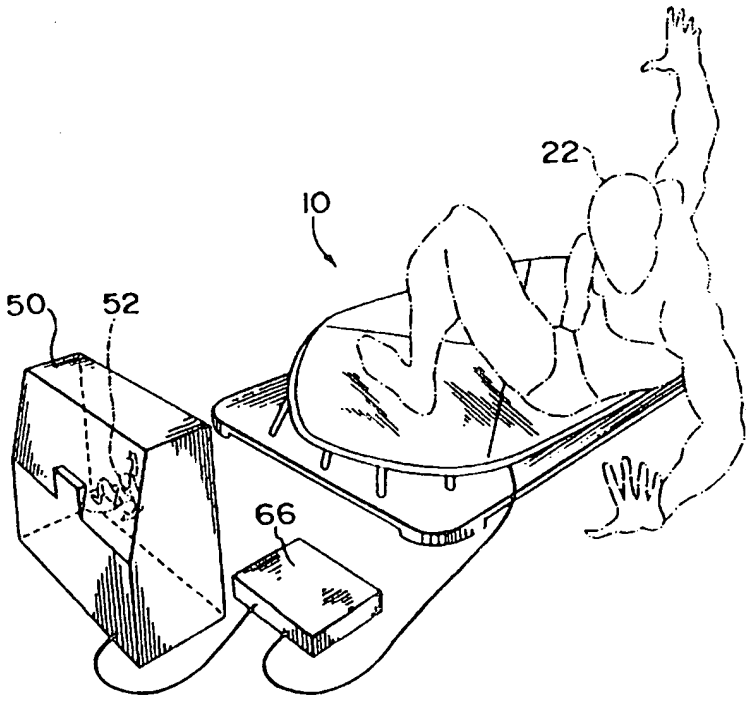
(54) Title: CONTROL APPARATUS FOR A VIDEO DISPLAY OR VIRTUAL REALITY SYSTEM

(57) Abstract

An entertainment-exercise apparatus for control of a video display or virtual reality system through an effector. For example, an apparatus for use in association with a joystick effector or remote sensing device to control movement of an electronic image on a video display (50) or in a virtual reality system, comprising: a surfaceboard (10) for user(s) interface, a base platform, a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform, a tilt-bias and limiting means consisting of a plurality of elastic and non-elastic members mounted between the surfaceboard and the base platform, a joystick effector and a control means to receive an effector such as a joystick and/or a remote sensing device, the arrangement being such that tilting of the surfaceboard about the support and tilt control pedestal by the operator imparts a corresponding movement to the effector when in place or through a remote sensing device.



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TITLE OF THE INVENTION

CONTROL APPARATUS FOR A VIDEO DISPLAY OR VIRTUAL REALITY SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to a control apparatus for a video game or virtual reality system, which is physically and interactively operated by the user. In particular, it relates to a body weight controlled apparatus which is designed to accommodate commercially available effectors one of which is commonly known as a joystick. By definition an effector is an input and output sensor that either communicates a user's or users' movements or commands to the computer or provides sensory stimulation from the computer to the user(s).

There are other types of effectors such as remote sensing or tracking devices. Some types of tracking systems are optical, inertial, mechanical, magnetic, or acoustic linkage (ultrasonic). The source transmits a signal that is picked up by the sensor and converted to position and orientation information. All trackers work by measuring changes in position or orientation relative to some source, which generates a signal; a sensor, which receives the signal, and a control box, which processes the signal and communicates with the computer. Some trackers, presently in development do not require a sending device. After the sensor is attached to an object and both the source and sensor are correctly oriented, the control box is sent an initialization signal from the

reality engine. This establishes the current orientation and position to the reference point. There are trackers currently available which provide sensing of movements to the accuracy of 0.01 to 0.25 inches and rotational values which vary from 0.1 to 1.0 degrees.

Objects can move forward or backward (x axis), up or down (y axis), and left or right (z axis) - these are known as translations. In addition, objects can rotate about any of these axes. Borrowing from flight terminology, these rotations are called roll (x axis), yaw (y axis), and pitch (z axis). Altogether, they add up to six different degrees of freedom in which the object can move.

Recreational machines which combine entertainment, exercise, and skill training are known. However, the majority offer only limited physical participation for the user and generally lack any significant element of entertainment. Furthermore, the recreational machines that do provide both physical participation combined with a significant amount of entertainment are usually very expensive and/or unsuitable for home use.

Two U.S. patents of background interest are U.S. Patent No. 4,817,960 and U.S. Patent No. 4,448,017.

Both U.S. patents use a vertical cylinder with electrical contacts around its circumference as the effector. It is apparent that these effectors are included in the U.S. patents as vital components in the operation of either design.

Boyd's patent (U.S. Patent No. 4,817,960) is a specialized apparatus and requires discussion because the design of the present invention can be applied to the same use as Boyd's design. Boyd's invention is a video display control apparatus for controlling the movement of an electronic image on a video display. It includes a base member, a seat for an operator, a support assembly for mounting the seat on the base member in facing relation to the video display, such that the seat can be tilted relative to the base member.

It seems evident from the Boyd patent that the controlling platform will tilt only to a maximum of 5 to 10 degrees from the horizontal neutral position; as well the platform is apparently allowed to rotate on the vertical axis. The latter of these observations is derived in the absence of information supporting the consideration of the user's induced vertical axis torsional forces (yaw) exerted upon the user platform. The Boyd patent shows no evidence of providing for the possibility of increasing or decreasing the bias influence of the front and rear as compared to the sides of the apparatus, nor does the patent provide for impact absorption of the user's input.

The Goo patent (U.S. Patent No.4,448,017) is similar to the present invention in some of its uses. The Goo invention is a video game control unit and attitude sensor. The apparatus controls a video game in which a surfing figure on a monitor moves over simulated waves to gain playing rewards. It is controlled by a foot actuated surf board simulator.

Goo's patent does not allow for the use of a joystick. In the present invention, the joystick provides an accurate directionally progressive control effector. The joystick operates on leverage principles. The joystick provides directional input, which the U.S. patents apparently offer, but the U.S. patents do not offer progression in a certain direction.

The base of Goo's machine does not imply, in its design, the absorption of impact forces delivered by the generally downward momentum of the user's weight. Not only does the lack of this consideration negatively affect the realistic feel to the user(s), it also contributes to unnecessary impact stress experienced by the user(s).

The base of the Goo machine as depicted in Figure 3 of his patent shows a contradiction when compared to the description of that area where the fulcrum rests upon it. Figure 3 shows the fulcrum recessed slightly into the base's surface as if it is to slide directionally when tilted, the fulcrum remaining located in the recess provided for it. Lines 41 - 45 column 3 of the Goo patent specifies that the fulcrum is intended to "roll in all directions" suggesting that the fulcrum has frictional adhesion with the base, instead of sliding in its recess as depicted in figure 3 of his patent. This contradiction in data, disclosed in the Goo patent suggests that the Goo design was underdeveloped at the time of patent application.

The preferred method of the Goo patent regarding the fastening of components is through the utilization of Velcro (trade-mark). Some of these components are interchangeable and

some are permanent components of Goo's apparatus. Velcro as a fastener is not capable of withstanding substantial lateral, diagonal or draft forces without separating. Therefore the Goo apparatus would not withstand the exertion of such forces because of this deficiency of the Velcro fasteners.

Exclusive of the fastening design's inherent problems of the Goo patent, there is a design problem that is, of its own, and yet related to the previous problem because of its lack of effectively controlling the vertical axis torsional or rotary forces (yaw). These problems are amplified when a momentum, inertia, rebound, etc. sensitive effector which transfers electrical data to the computer is implemented as described in the Goo patent. Goo's design does not seem to have any concern for the control of these torsional forces (yaw).

Goo's patent provides for no extra bias influence toward the front and rear of the machine as compared to the sides.

Another deficiency of the Goo invention is that the rolling point of the fulcrum on the base is the pivot point for the controlling platform and provides the pivoting movement too low on the support apparatus to simulate a realistic feel to the user. The control platform moves laterally as it tilts. The Goo patent's only suggested effector influences are "dependent only on its own weight and the attitude of the board" (lines 15 to 17, column 2 of the Goo patent). The effector implemented in the Goo patent does not allow for progressive directional input to the computer, only directional control. The Goo patent lacks the application of some type of tilt limiting mechanism. There is nothing to stop the

tilting motion before the platform touches the floor.

Goo's patent depicts the design as being solely for foot operation by the user. The front and rear wobbling of the control platform in Goo's patent combined with rapid control input of the user and a computer control effector that is susceptible to rebound, centrifugal, etc. forces, would predictably, send the control mechanism into a frenzy which would be incomprehensible to the computer.

Further development of the Goo patent would surely evolve rapidly into a much different design than the patent identifies, or into failure of the design in general. The Goo patent's apparatus does not appear feasible for manufacture or operation.

Accordingly, it is an object of the present invention to provide a video game or virtual reality control apparatus which is actuated by a user(s)/surfaceboard interface. It is another object of the present invention to provide a signal to a computer through a commercially available joystick effector or remote sensing device to determine the orientation of the board and to translate the change in orientation along an x-axis / z-axis path to a video game control unit and display or virtual reality system. It is still a further object of the invention to provide a user(s) actuated video control apparatus which provides the user with a variety of levels of physical challenge.

SUMMARY OF THE INVENTION

These and other objects are accomplished in accordance with the present invention. Accordingly, the invention herein comprises an apparatus for use in association with an effector to control movement of an electronic image on a video display or the reciprocal control of the surfaceboard by the computer or a virtual reality system, comprising a surfaceboard/user interface, a base platform, a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform, and a control means to accommodate an effector, the arrangement being such that the tilting of the surfaceboard by the operator imparts a corresponding movement to the effector when in place.

The invention further comprises an apparatus for use in association with an effector to control movement of an electronic image on a video display or the reciprocal control of the surfaceboard by the computer or a virtual reality system, comprising: a surfaceboard/user interface, a base platform, a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform, a tilt-bias means to resiliently resist movement of the surfaceboard about the support and tilt control pedestal, and a control means to accommodate an effector, the arrangement being such that the tilting of the surfaceboard by the operator imparts a

corresponding movement to the effector when in place.

The invention still further comprises an apparatus for use in association with an effector to control movement of an electronic image on a video display or the reciprocal control of the surfaceboard by the computer or a virtual reality system, comprising: a surfaceboard/user interface, a base platform, a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform, a tilt-bias and limiting means consisting of a plurality of elastic and non-elastic members mounted between the surfaceboard and the base platform, a joy stick effector and a control means to accommodate an effector and/or a remote sensing device, the arrangement being such that the tilting of the surfaceboard by the operator about the tilt and control pedestal imparts a corresponding movement to the effector when in place.

The present invention offers many differences that result in significant advantages of operation and in a much wider variety of purposes or uses over the above mentioned conflicting existing patents.

While the purposes and uses of the present invention include those of the referenced U.S. patents, the present invention exceeds the simulations produced by those of the U.S. patents in both quality and quantity. The two U.S. patents are more similar to each other than the present invention is to either of them.

The control apparatus of the present invention is ideally suited for use with simulated sporting activity computer programs

or virtual reality systems or video games such as surfing, snow boarding, tobogganing and the like. It may also be used with attachments and thus also be used for simulated activities such as jet skiing and water skiing. As such, the apparatus allows the user to exercise and develop his or her skill at the simulated sporting activity while being entertained at the same time. The apparatus is also compact and can easily be stored when not in use.

The joystick provides directional input, which the U.S. patents apparently provide, but the U.S. patents do not offer progression in a certain direction as does the present invention.

The method of information transfer discussed in the disclosure of the present invention is referred to only as one possible effector (joystick) to be utilized, and this effector's inner workings are not included as a claim in the disclosure of the present invention. The current preferred developmental effector (joystick) of the present invention is well established in the field of computer input hardware and is less expensive than either of the U.S. patents' effectors.

The present invention is superior to Boyd's machine in operation and can be produced at less cost. Obviously the adaptability and expandability of the present invention are far superior. Boyd's machine would indubitably be inferior to the design of the present invention if Boyd's machine attempted all of the simulations of which the present invention is capable.

The fact that the Boyd patent does not show evidence of differentiating the bias influence from front and rear to the sides and that there is no provision for impact absorption would

theoretically make Boyd's machine inferior to the present invention in all simulations. From an overall analysis by the author of the Boyd invention compared to the present invention - the Boyd invention appears to be rendered obsolete by the present invention.

The Goo design presents its bias method as a partial support mechanism as well as a tilt angle bias. Control of torsional forces (yaw) is of high priority in the design of the present invention. The present invention presents its bias method as its means of tilt angle bias, and as a means of assisting the limiting of vertical axis rotary movement (yaw) when relating the surfaceboard component motion compared to the base.

The present invention provides downward impact absorption through the design of its base. The Goo patent does not show any capability of lessening downward impact.

Goo's patent does not allow for the use of a joystick. In the present invention, the joystick provides an accurate directionally progressive control effector. The joystick operates on leverage principles.

The adaptability and expandability of the disclosed design of the present invention, in the aspect of attaching components to its surfaceboard is one of the most advantageous features of the present invention. It is possible to replace the surfaceboard with other surfaceboards having different shapes. Additional attachments can be made to any of the surfaceboards without reducing the strength, stability and operating qualities of the present invention. Attachments to attachments are possible with the design of the present invention.

One example of a simulation of which Goo's design would not be capable, and in which the present invention adapts to quite easily, is a wall mounted (surfaceboard positioned on a vertical plane instead of horizontal) punch, kick and body blow simulator with computer measured strength of blow video displays.

The previous statements show evidence that the Goo design, if operable, is inferior to the realistic feel to the user of the present invention. In the opinion of the author, realism to the user is the main priority of any simulation.

In the apparatus of the present invention translations along the x, y and z axes are limited to near zero movement. Free rotation is allowed about the x axis (roll) and the z axis (pitch). Rotation about the y axis (yaw) is limited to near zero. It may be desirable for certain simulations to induce a yaw movement. This could be a computer controlled or user induced movement about the y axis to produce a more realistic physical sensation to the user corresponding to the simulation on the video display unit or the virtual reality system.

The basic principles and theories of the present invention differ greatly from either of the above referenced U.S. patents. Some uses are similar but are accomplished through different methods of design. The design of the present invention operates naturally, simply and precisely. The prior art devices employ relatively sophisticated and unproven effectors or orientation sensors and do not accommodate commercially available joysticks or remote sensing devices as in the design of the present invention. Furthermore, they offer neither the exercise component

or tactile sensations or realistic "feel" of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the invention will become apparent upon reading the following detailed description and upon referring to the drawings in which:

FIGURE 1 is a perspective view of the video game or virtual reality control apparatus of the present invention;

FIGURE 2 is a perspective view of the embodiment of Figure 1 with the surfaceboard removed and inverted to show its underside and the upper surface of the base board;

FIGURE 3 is a side view of the embodiment of Figure 1 with the user shown in ghost;

FIGURE 4 is a side view, partly in cross section, of the support and tilt control pedestal and the effector assembly;

FIGURE 5 is a perspective view of the embodiment of Figure 1 with the user shown in ghost and the simulated user's image appearing on the video display unit and a computer game base; and

FIGURE 6 is a perspective view of the embodiment of Figure 1 showing a hand control, two remote sensing devices, the signal processor, computer game base, and head mounted display unit. The edges of the surfaceboard are designated as the source for the remote sensing device.

It is important to note that the wires appearing in Figures 1 through to Figure 6 are shown as possible linkages

between components. It is important to note further, that signals between components may be transmitted without wires.

While the invention will be described in conjunction with illustrated embodiments, it will be understood that it is not intended to limit the invention to such embodiments. On the contrary, it is intended to cover all the alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the drawings, similar features have been given similar reference numerals.

The present invention allows for user(s) input control to the machine through the use of many body parts and attached components.

The principal components of the video game control apparatus 10 include a tilt board or surfaceboard 12, support and tilt control pedestal 14, tilt bias and limiting means 16, effector assembly 18 and base board or base platform 20.

The surfaceboard 12 can be any shape providing it has a surface that allows for an operational connection with the machine's components between the surfaceboard and the base board. The surfaceboard 12 is mounted on a support and tilt control pedestal 14 and is substantially parallel to the base board 20. The surfaceboard 12 is constructed from materials such as plastics, fibreglass, wood or the like and may be provided with

rigidity supports 11. The actual surface 15 of the surfaceboard is a non-slip surface. Holes 45 are provided in the surfaceboard to secure any desired attachments.

The base board 20 is also generally rectangular in shape and constructed from similar materials as the surfaceboard 12. In addition, feet 13 can be added with a non-slip coating or a padded underlay (not shown) can be added under the base board 20 to cushion the apparatus when in use to absorb some of the impact from the user. The base board 20 should for certain applications, preferably be fitted with outrigger legs (not shown) as a safety feature to ensure that the base board, and thus the apparatus, remains in a stable position.

The apparatus 10 is operated by a user(s) 22 who in the interaction with the apparatus 10 may stand, kneel, sit or lie on the surfaceboard 12. In these interactions with the surfaceboard 12 the user(s) 22 operate the apparatus by shifting body weight on the surfaceboard 12. The user(s) 22 may also interact with the apparatus 10 by delivering forces other than body weight when the apparatus 10 is in a variety of positions. Interaction with the apparatus 10 will vary with the attachments to the surfaceboard 12 and/or the shape of the surfaceboard 12 itself.

The applied forces tilt the surfaceboard 12 radially about the support and tilt control pedestal 14 from side to side, front to back or at a diagonal relative to the base board 20. The movement of the surfaceboard is converted into signals by the effector assembly 18 which are transmitted by a line 24 or by other means to a computer or other similar device where, for

example, the movement of the user 22 is translated into that of the simulated activity on a video display screen or a virtual reality system. An optional hand control 26 may also be provided to control additional game functions.

Control of torsional forces (yaw) is of high priority in the design of the present invention. The present invention presents its bias method as its means of tilt angle bias, and as a means of assisting the limiting of vertical axis rotary movement (yaw) when relating the surfaceboard component motion compared to the base.

When in place the surfaceboard 12 is mounted on the base board 20 by the support and tilt control pedestal 14, which is centrally located between both boards. The support and tilt control pedestal 14 consists of the upper pedestal mount 22a, fastened to the inner face of the surfaceboard 12; lower pedestal mount 22b, fastened to the inner face of the base board 20, and a universal joint 24, as best seen in Figure 2. Referring to Figures 2 and 4, it will be seen that the universal joint 25 consists of upper and lower shafts 28a and 28b respectively. The square male section of the upper shaft 28a of the universal joint 25 engages a square female recess 30a in the upper pedestal mount 22a, while the square male section of the lower shaft 28b engages a square female recess 30b in the lower pedestal mount 22b. This connecting mechanism prevents any induced rotary movement about the vertical axis (yaw). In this way the surfaceboard 12 is firmly supported and held in place above the base board 20, yet is also easily removed for ease of storage, adjustment or for

other reasons.

The effector assembly 18 consists of a commercially available joystick apparatus 32 having a control box 34, shaft 36, control knob 38 and controller tube or control means 40 having a control knob bore 42. In a variation, the shaft 36 of control box 34 is resiliently flexible to permit movement of the shaft beyond the range of movement normally permitted by the joy stick apparatus. This prevents damage to the joystick apparatus should the range of movement of the surfaceboard 12 exceed that normally permitted by the apparatus. The control box 34 is mounted in a position perpendicular to the base board 20 immediately in front of and in line with the lower pedestal mount 22b, while the controller tube 40 is mounted in similar relationship to the upper pedestal plate 22a on the surfaceboard 12, as best seen in Figure 2. The arrangement is such that when the inner face of the surfaceboard 12 is placed over the base board 20, the upper pedestal plate 22a aligns with shaft 28a of the universal joint 24 and is engageably received into the bore 30a. At the same time, controller knob 38 of the joy stick apparatus 32 aligns with and is engageably received within the control knob bore 42 of the controller tube 40. The effector assembly can be reversed with the control box of the joystick mounted on the surfaceboard 12 and the controller tube mounted on the base board 20.

The tilt-bias and limiting means consists of a series of elastic members or tubular elastic loops 44 and relatively non-elastic series of members as tilt limiters 45. These are

secured to upper and lower non-abrasive fasteners 46a and 46b which are located around the periphery of the inner face of the surfaceboard 12 and the inner face of the base board 20 to form a somewhat oval shaped ring around the support and tilt control pedestal 14. The loops serve to level the surfaceboard 12 and provide resistance to its movement by the user(s) away from the plane of the base board. Using this arrangement there is more resistance at the ends of the surfaceboard 20 than at the sides. This is because loops must expand a greater distance for a given amount of tilt, to simulate a sports board's actual tilt resistance tendency, The density and elasticity of loops 44 may be varied depending upon the application required to provide a high level of resistance, or tension, and thus a fast return from a tilted position, or a slower more exaggerated response with reduced resistance.

The present invention is capable of this and provides many required adjustments to the extra bias influence toward the front and rear of the apparatus, in consideration of different simulation requirements. The progression of the strength of the bias may be adjusted using the present invention's design, or the strength of the bias may be adjusted in many formations of strengths for different effects.

The apparatus can be connected to any computer or game control capable of receiving signals from an effector. This apparatus is preferably used with sporting game programs which simulate activity of the participant. For example, a snowboarder will be presented with a number of challenges while boarding down

a slope and the user(s) on the control apparatus will have to respond to these by shifting weight to manipulate the board, to avoid from falling or hitting obstacles. The desired degree of resistance of the tilt-bias can be varied to accommodate the weight of the user(s). The elastic members can be changed to stronger or more members for heavier users or weaker or fewer bands for lighter weight users.

The present invention is capable of operating precisely with attached components even though there would be an increase in said forces because of the increase in leverage due to the attached components.

As best seen in Figure 5 the user 22 is operating the apparatus 10 to manipulate the simulated image 52 on the video display or TV 50. The computer base 66 converts the electrical signal from the apparatus 10 to the TV 50.

Referring to Figure 6 a typical configuration for a virtual reality system is shown. The system is comprised of the apparatus 10, hand control 26, and the edges 60 of the surfaceboard 12 which are designated as the sources of information for the sensors 62. The signal processor 64 receives a signal from the sensors 62 and modulates the signal before sending it to the computer base 66. The virtual reality simulation is created by the computer base 66 and viewed by the user through a head mounted display unit 68 or other video display devices. The aforementioned remote sensing system could be used in combination with other effectors such as a joystick.

Joysticks are used to produce input data to a computer

corresponding to the attitude, or "tilt" of the joystick control, which is moved along an x-axis / z-axis path to control movement of a display character on a video display screen or virtual reality system. Most joysticks are adapted to provide signals corresponding to radial movements around their circumference and progressive movements along the same radial. When used in combination with a joystick, or other effector, the control apparatus of the present invention acts as an orientation sensing device which determines the angle of tilt of the surfaceboard, and the surfaceboard provides the interface with the user. In turn, the vertical angle and radial direction of tilt is relayed as a signal to a video game control unit or a virtual reality system.

The joystick provides progressive directional input. An example for a requirement of progression is when controlling a simulation that may turn in a simulated way to the left or right, the effector should be capable of providing input in a way that allows the simulation to turn slightly through to turning sharply. The joystick allows this required progression.

The joystick operates mainly on leverage and need not be in a vertical position to be capable of naturally returning to a neutral position. It may be used at any angle to gravity, including an inverted position, without complications.

Neither of the U.S. patents implement a universal joint in their design. The universal joint is a primary component of the present invention with many of its principles and claims stemming from said universal joint. The author has no

recollection of any design for any purpose that utilizes a universal joint as a support mechanism. Most dictionaries describe a universal joint as a mechanism used to transmit rotary power by a shaft at any selected angle. It is submitted by the author that the discovery of a new use for a veteran geometric mechanism may be exposed in this disclosure.

The present invention is capable of at least 30 degrees tilt angle of the platform from a horizontal neutral position, in any direction. The universal joint is the component used with the design of the present invention that contributes mainly to limiting the induced vertical axis rotating tendency (yaw), which deserves consideration for most simulations.

Thus it is apparent that there has been provided in accordance with the invention an entertainment/exercise apparatus that fully satisfies the objects, aims and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the invention.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An apparatus for use in association with an effector to control movement of an electronic image on a video display or virtual realty system, comprising:

a surfaceboard as an interface with the operator;

a base platform;

a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform; and

a control means to receive an effector, the arrangement being such that the tilting of the surfaceboard about the support and tilt control pedestal by the operator imparts a corresponding movement to the effector when in place.

2. An apparatus according to claim 1, further comprising a tilt-bias and limiting means to resiliently resist movement of the surfaceboard about the support and tilt control pedestal and to limit the tilt at the desired maximum angle of tilt.

3. An apparatus according to claim 2, wherein the tilt-bias and limiting means consists of a plurality of elastic and non-elastic members or any other elastic tilt-bias and limiting mechanism, mounted between the surfaceboard and the base platform.

4. An apparatus according to claim 3, wherein the elastic and non-elastic members are mounted about the support and tilt control pedestal.

5. An apparatus according to claim 2 wherein the tilt-bias and limiting means consists of a series of fasteners mounted along the periphery of the inner side of the surfaceboard and a series of fasteners mounted on the inner surface of the base platform, corresponding to those on the surfaceboard, having elastic and non-elastic loops engaged thereon.

6. An apparatus according to claim 1 wherein the control means comprises a mounting bracket on the base platform to receive the base of a joystick effector and a control tube means on the inner surface of the surfaceboard to receive the joystick effector shaft.

7. An apparatus according to claim 6 wherein the mounting bracket and the control tube means are adjacent to the support and tilt control pedestal.

8. A control means according to either claim 6 or 7 wherein the control means further comprises a resiliently flexible shaft for attachment to the joystick effector shaft.

9. An apparatus according to any one of claims 1, 2, 3, 4, 5, 6, or 7 wherein the support and tilt control means is a universal joint which is the primary component of the support and tilt control pedestal.

10. An apparatus according to any one of claims 1, 2, 3, 4, 5, 6, or 7 wherein the surfaceboard can be any shape providing it has a surface that allows for an operational connection between the surfaceboard and the base board.

11. An apparatus according to claim 9 wherein the surfaceboard can be any shape providing it has a surface that allows for an operational connection between the surfaceboard and the base board.

12. An apparatus for use in association with a joystick effector to control movement of an electronic image on a video display or virtual reality system comprising:

a surfaceboard as an interface with the operator;

a base platform;

a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform;

a tilt bias and limiting means to resiliently resist movement of the surfaceboard about the support and tilt control pedestal; and

a control means to receive a joystick effector, the arrangement being such that tilting of the surfaceboard about the support and control pedestal by the operator imparts a corresponding movement of the joystick shaft of the joystick effector when in place.

13. An apparatus to control movement of an electronic image on a video display or virtual reality system comprising:

a surfaceboard as an interface with the operator;

a base platform;

a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform;

a tilt-bias and limiting means consisting of a plurality of elastic and non-elastic members or any other tilt-bias and limiting mechanism mounted between the surfaceboard and the base platform;

a joystick effector; and

a control means to receive a joystick effector, the arrangement being such that tilting of the surfaceboard about the support and tilt control pedestal by the operator imparts a corresponding movement of the joystick shaft of the joy stick effector.

14. An apparatus according to claim 1 further provided with surfaceboard movement control means operable as required by the operator.

15. An apparatus according to claim 1 wherein the effector is a remote sensing device.

16. An apparatus according to claim 1 further provided with means for intentional yaw rotation of the surfaceboard through computer control or user manipulation.

17. An apparatus to control movement of an electronic image on a video display, comprising:

a surfaceboard as an interface with the operator;

a base platform;

a support and tilt control pedestal mounted between said surfaceboard and said base platform, adapted to support the surfaceboard while permitting it to be tilted radially thereabouts relative to said base platform;

an effector;

a control means to receive an effector, the arrangement being such that the tilting of the surfaceboard about the support and tilt control pedestal by the operator imparts a corresponding movement to the effector when in place; and

a computer to process and convert in formational signals from the effector into the controlled movement of an electronic image on a video display.

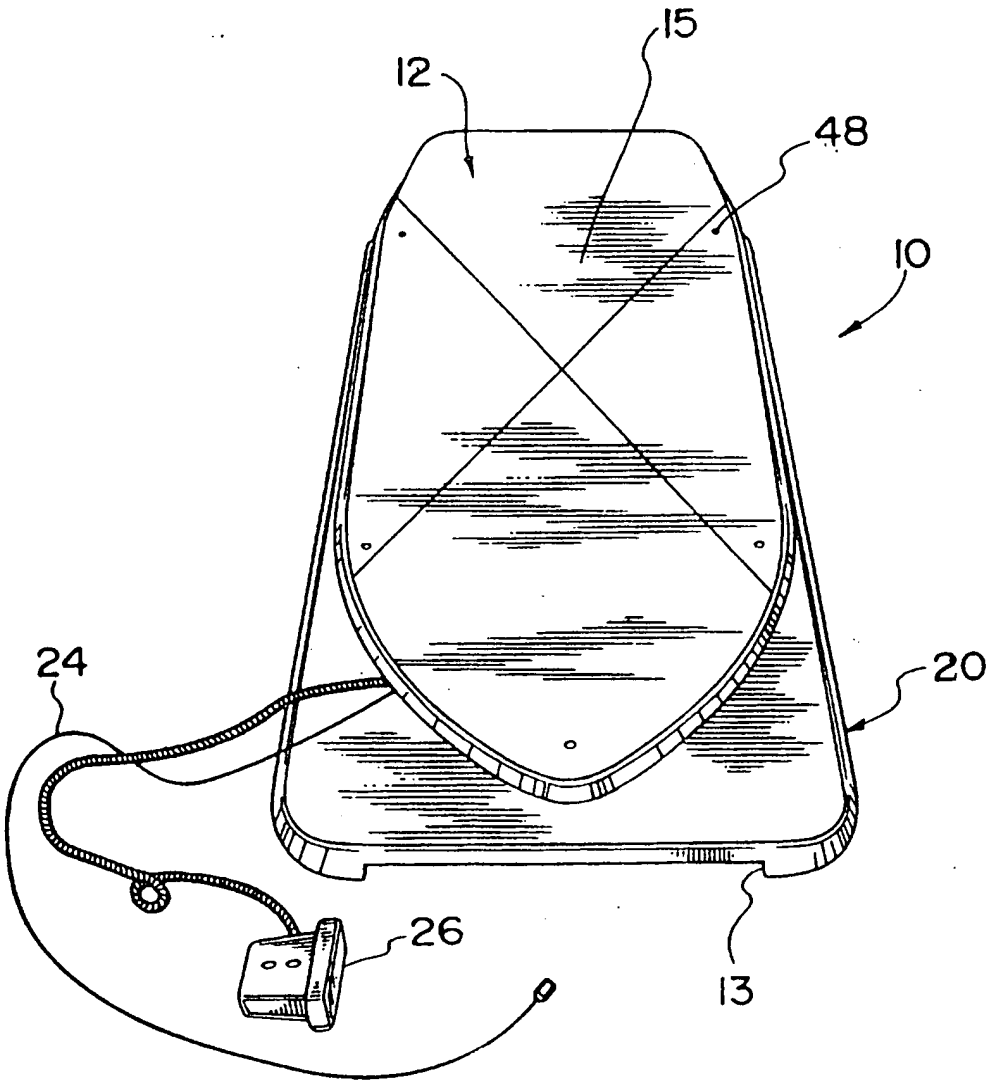
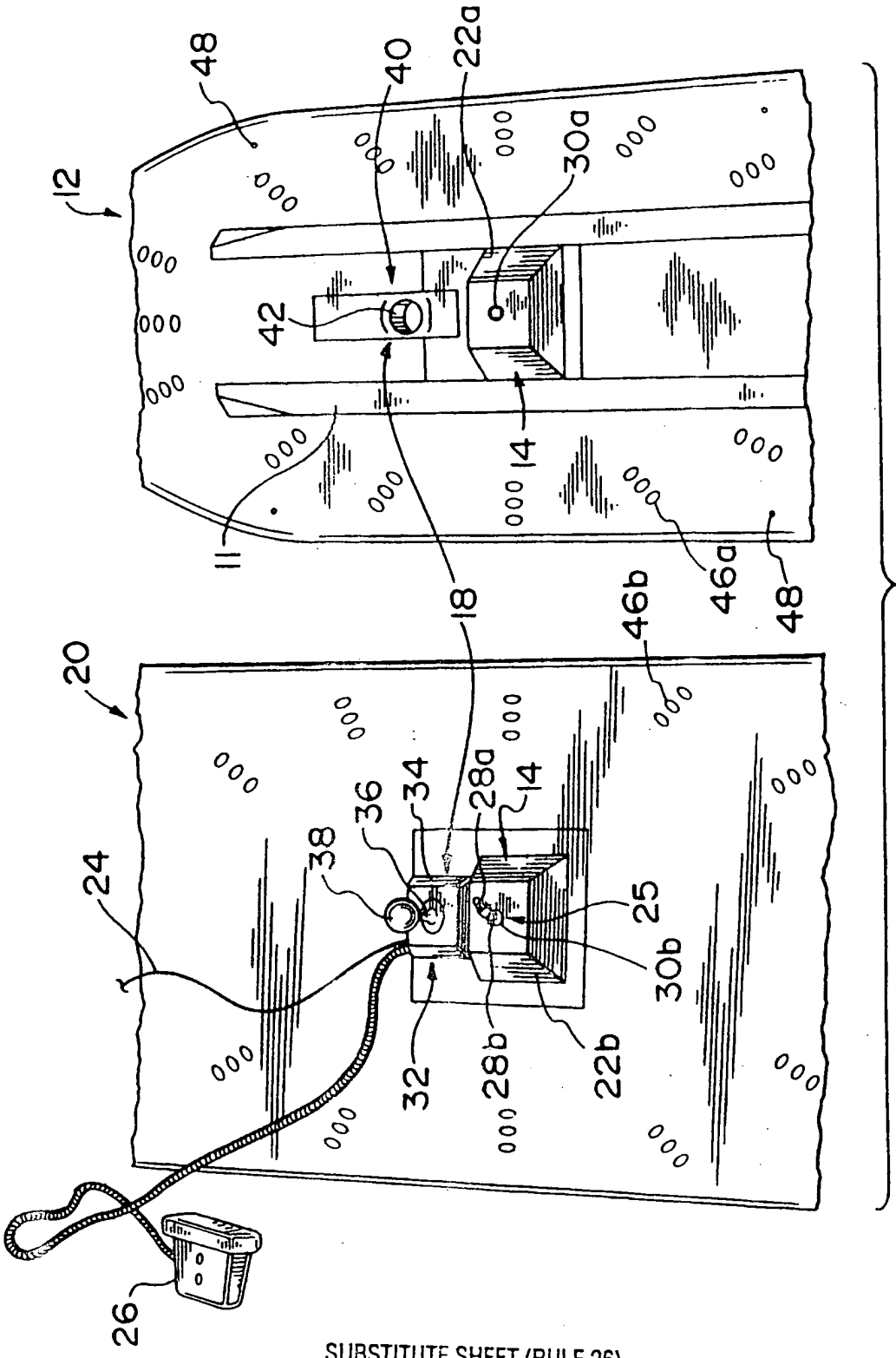


FIG. 1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40
22a
30a
12
42
14
11
18
46b
46a
48
20
34
28a
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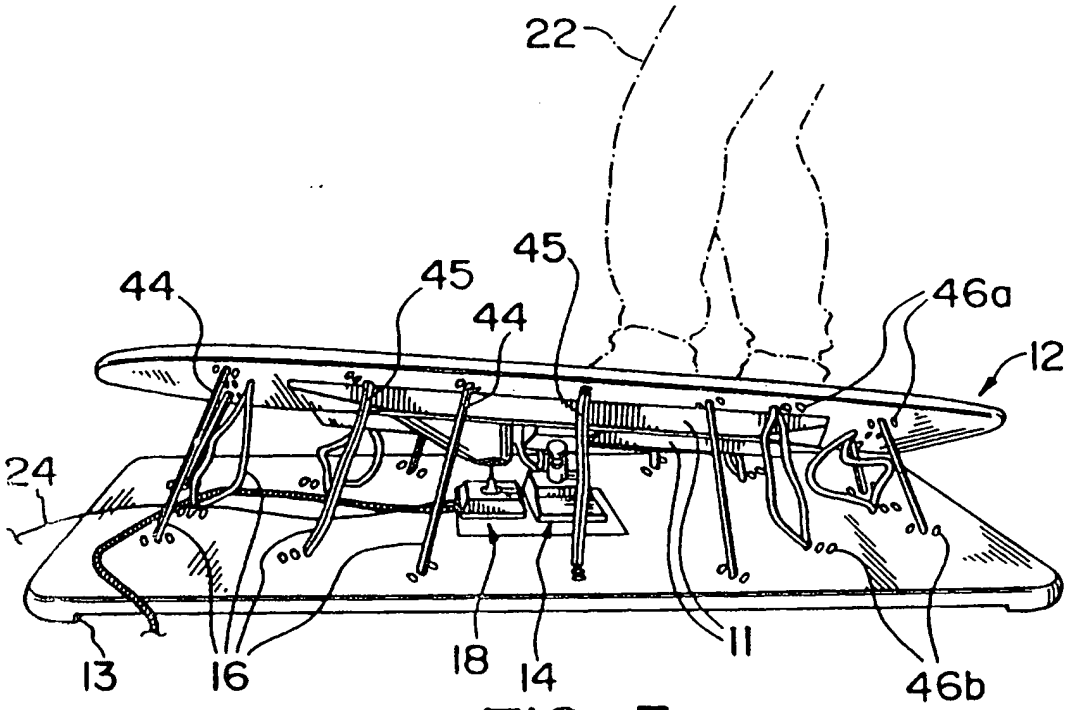
25
30b
32
28b
22b
26

FIG. 2


22
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44
44
46a
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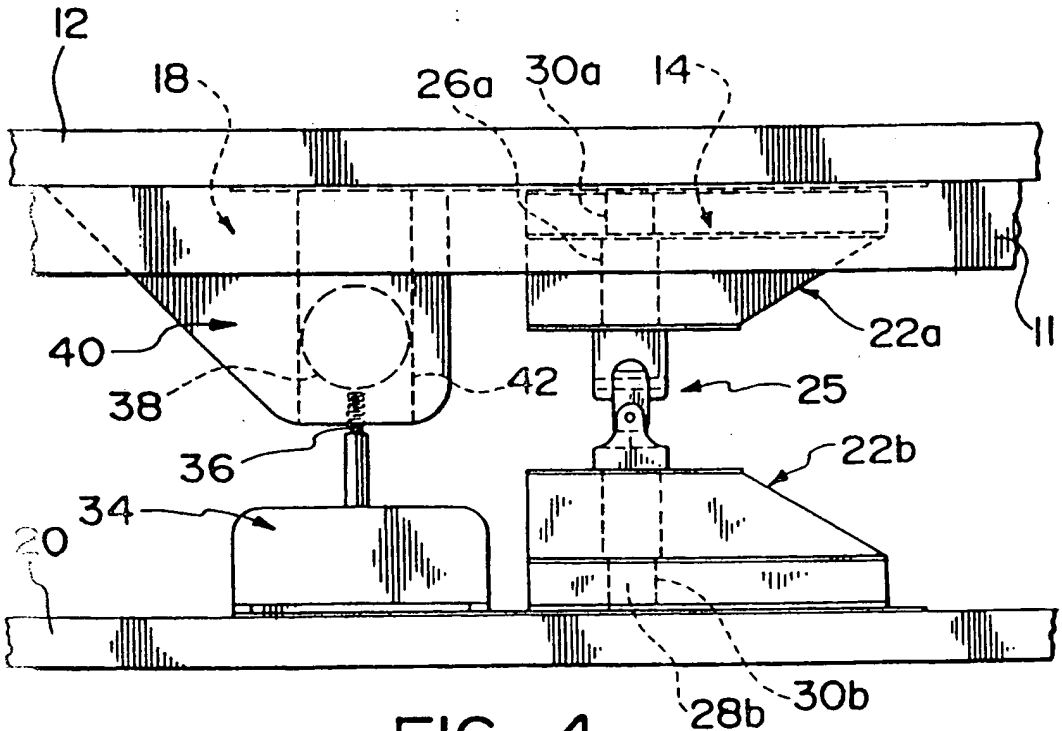
24
13
16
18
14
11
46b

FIG. 3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22a
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42
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36
22b
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28b
30b

FIG. 4

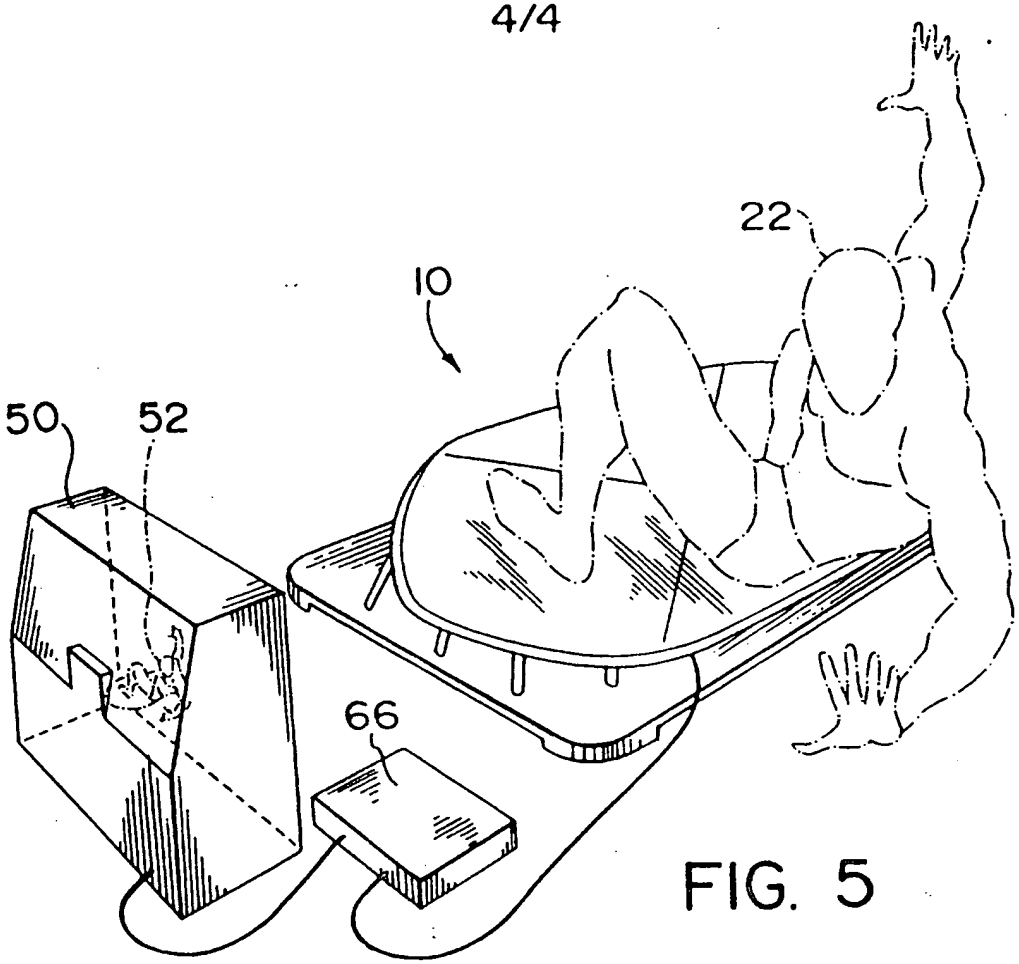

FIG. 5

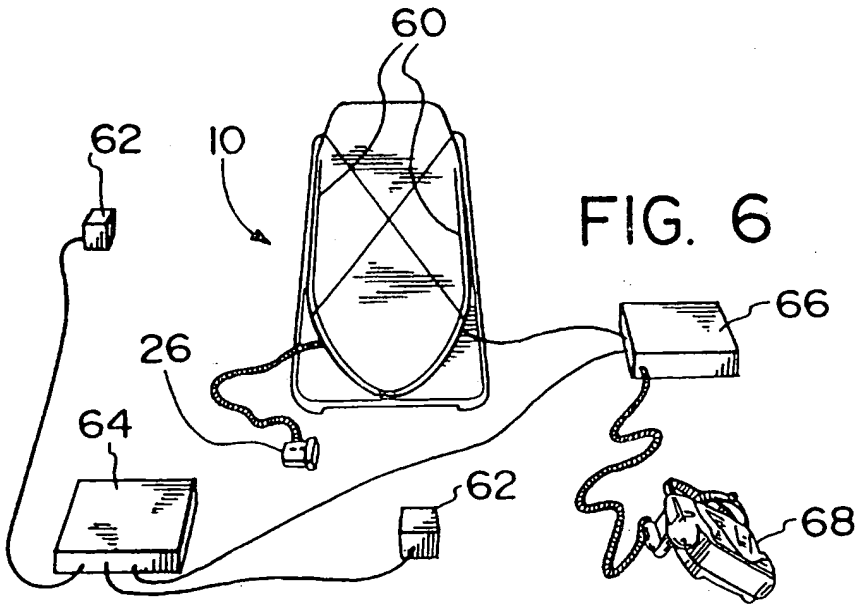

FIG. 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 95/00492

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A63F9/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A63F A63B G09B G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US,A,4 660 828 (WEISS JOHN) 28 April 1987 see column 3, line 34 - column 5, line 34 see figures 1,6,7	1,12,13,17 8,10,11,14
A	US,A,4 817 950 (GOO PAUL E) 4 April 1989 see column 6, line 59 - column 7, line 50 see column 3, line 19 - line 41	1,12,13,17
A	DE,A,42 37 830 (BALLY WULFF AUTOMATEN GMBH) 5 May 1994 see column 1, line 54 - column 2, line 33 see column 3, line 14 - line 64	1,12,13,17

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 November 1995	14. 12. 95

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Wentzel, J

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 95/00492

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US,A,5 158 459 (EDELBERG RALPH) 27 October 1992 see column 3, line 4 - line 16 see column 7, line 36 - column 8, line 6 see figure 6	6
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A	FR,A,2 093 621 (OLOFSON JOHN) 28 January 1972 see page 2, line 10 - page 3, line 7 see figures 1,2	1-5,9, 12,13,17
A	GB,A,2 270 634 (PETERS JULIAN DAVID) 23 March 1994 see page 1, line 8 - line 16 see figures 1-5	2-5
A	US,A,4 749 180 (BOOMER TED) 7 June 1988 see column 1, line 58 - column 2, line 58	16
A	EP,A,0 275 665 (SMITHARD MICHAEL ANTHONY ;TREADWELL SHIRLEY ANNE (GB)) 27 July 1988 see column 8, line 44 - column 9, line 42	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

ational Application No
PCT/CA 95/00492

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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US-A-4817950	04-04-89	NONE		
DE-A-4237830	05-05-94	NONE		
GB-A-2188711	07-10-87	NONE		
US-A-5158459	27-10-92	NONE		
DE-A-4004554	22-08-91	NONE		
FR-A-2093621	28-01-72	AT-A,B	305849	15-01-73
GB-A-2270634	23-03-94	NONE		
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EP-A-0275665	27-07-88	DE-A- US-A-	3784903 4906192	22-04-93 06-03-90